

**Technology  
for**

# **Alaskan Transportation**

*Spring 1987 — Volume 3  
University of Alaska — Fairbanks  
Transportation Technology  
Transfer Program*

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## **Insulating Roadways and Runways on Permafrost**

The engineer has only three options when dealing with permafrost. Avoid it. Destroy it. Or preserve it. When roads and airports must be built on permafrost, engineers can preserve the permafrost by placing insulation between the permafrost and surface material. The development of this technology began back in 1968, when the Alaska Department of Highways built their first section of insulated roadway just south of Anchorage. This first project was conceived to control frost heaving rather than permafrost.

That experiment was followed a year later by two projects for the record books. The Alaska Department of Highways built the first section of insulated roadway over permafrost in North America at a site near Chitina, and the Department of Public Works built the first insulated airfield runway over permafrost at Kotzebue. Since then, DOT&PF has built six additional roadway sections over permafrost (totaling 3.6 lane-miles) plus 15 insulated sections to control frost heaving (totaling 11

lane-miles). Three additional insulated runways have also been built since then. The subgrade insulation has been primarily extruded-expanded polystyrene (DOW styrofoam HI and UCI Foamular). But one installation used polyurethane foam, and three used white molded polystyrene "bead-board." Evaluations of the long-term thermal performance of these installations have included sampling and testing of the insulations to determine the retained thickness, thermal conductivity, and compressive strength. Based on these observations, foamed-in-place polyurethane insulation is not accepted for use as a subgrade insulation by DOT&PF, while extruded polystyrene insulation has demonstrated superior performance and longevity. Layers of molded polystyrene beadboard insulation have given acceptable performance, but beadboard must be installed at a 30 to 50% greater thickness than extruded polystyrene to

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## **Installing Guardrails**

A new publication entitled "Improving Guardrail Installation on Local Roads and Streets" provides a general guide to effective and low-cost methods of enhancing highway safety with guardrails.

The booklet helps the reader understand the critical and desirable features of guardrail systems. Based on accident analysis, research and testing of concepts, guardrail systems have changed significantly over the past two decades. Many existing systems are now

functionally inadequate.

The booklet contains detailed information on the design, construction and maintenance of guardrails. The four most commonly used guardrail systems are discussed and illustrated, and the factors affecting their performance are summarized. The guidelines and recommendations included in the booklet are based on actual situations and observations, and they reflect the actual

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## Insulating Roadways and Runways

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provide comparable thermal performance. DOT&PF engineers also compared measured late summer permafrost thaw depths for insulated airfields with calculated thaw depths using the "modified Berggren" calculation method (now programmed for IBM PC computers), and actual site soil and insulation properties. These comparisons demonstrated that this method predicts thaw depths slightly

greater than the actual values. This calculation method provides reasonable values for conservatively designed insulation. So what conclusions did they make? When installed beneath roads and airfields, moisture absorption by the insulation was quite low, and the functional design life of extruded foams should be much greater than 20 years. If you would like to learn more about using insulation beneath roadways and runways, or about

calculating freeze and thaw depths, you'll want to read reports entitled, "Insulation Performance Beneath Roads and Airfields in Alaska" by David Esch, and "A Personal Computer Solution to the Modified Berggren Equation" by W. Alan Braley. You can obtain copies of these volumes by writing Publications, Transportation Technology Transfer Program, University of Alaska-Fairbanks, Fairbanks, AK 99775-1760. **AT**

# News & Views

## Wasilla's Experimental Pavement

The City of Wasilla is conducting an interesting experiment that could make their paved roads both safer and cheaper to maintain in the winter. They have paved seven intersections with asphalt that incorporates encapsulated calcium chloride throughout the top inch of the pavement. As the pavement wears, the grains of encapsulated salt (called Verglimit) are opened and slowly release salt.

This slow release of salt should reduce the amount of salt that road crews will need to apply. The Verglimit should also reduce the number of accidents related to snow and ice. Finally, the use of Verglimit should reduce the potential contamination of Lake Wasilla and Lake Lucile by salty runoff. *Technology for Alaskan Transportation* will report the results of Wasilla's experiment.

## Pothole Pairs

*The Wall Street Journal* recently ran an article about potholes. It seems an enterprising individual in the Washington, DC, area supports his wife and seven kids by waiting around potholes for hubcaps to fall off cars when wheels drop into the potholes. If the motorist stops, the fellow helps retrieve and replace the hubcap as a free service. If the motorist does not stop, the hubcap is added to the entrepreneur's sizable inventory which is housed in a baby-blue school bus. The fellow parks his bus on busy street corners and sells the hubcaps for around \$25 each.

Sounds farfetched? Well, at one location there were four potholes—two in the west bound lanes, and two in the eastbound lanes. In two days, he amassed "about 400 hubcaps" from that one location. The moral of this is there's more to the problem of pothole repair than sometimes meets the eye—you need to look at the "hole" story! (With thanks

and a tip of the hat to the *Technology Transfer Quarterly*, published by the Technology Transfer Center in Ohio.)

## Pothole Repairs

Several publications on pothole repair are available without charge from the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL).

*The Engineer's Pothole Repair Guide* is CRREL Cold Regions Technical Digest 84-1. *Comparison of Three Compactors Used in Pothole Repair* is CRREL Special Report 84-31. *Pothole Primer—A Public Administrator's Guide to Understanding and Managing the Pothole Problem* is CRREL Special Report 81-21.

These publications are available from Publications, U.S. Army Cold Regions Research and Engineering Laboratory, 72 Lyme Road, Hanover, NH 03755-1290.

## Software and Source Book Available

This 234-page publication, entitled *Software and Source Book*, describes microcomputer software in the areas of transit operations, transportation planning, traffic engineering and paratransit operations.

Software developed by both private contractors and public organizations is listed.

The book also tells how to obtain the software. The publication is updated annually by the Urban Mass Transportation Administration and the Federal Highway Administration.

Single copies of the report are available at no charge.

Send a self-addressed mailing label to the Technology Sharing Program (I-30SS), Office of the Assistant Secretary for Governmental Affairs, U.S. Department of Transportation, Washington, DC 20590. Please give the report's title when ordering.

## Microcomputer Support Center

The Federal Highway Administration (FHWA) has a new microcomputer support center at the University of Florida Transportation Research Center. The new service is called the Center for Microcomputers in Transportation (McTrans).

The primary role of McTrans will be to serve as a center for technology exchange of microcomputer software related to transportation. The center will distribute public domain software at a minimal cost to the user and will provide technical assistance in the use of the software.

McTrans will facilitate the flow and exchange of microcomputer resources among professionals nationwide and abroad. The center will reduce duplication of effort and (continued on page 3)

## Free Magazines

The following periodicals are offered free of charge to qualified individuals (or agencies) in the transportation industry.

For a free subscription, write a letter of request including your title and a description of your job responsibilities.

*Airport Services Management*. A nationally distributed monthly publication. Fulfillment Department, Airport Services Management, 731 Hennepin Ave., Minneapolis, MN 55403.

*American City and Country*, published monthly. Articles on urban development and street maintenance. American City and Country, 6255 Barfield Road, Atlanta, GA 30328.

*ATSA Signal*. A quarterly publication designed for those interested in permanent signing, delineation and/or traffic control in construction areas. American Traffic Services Association, Inc., Stafford Executive Building, Route 4, Box 18, Stafford, VA 22554.

## News & Views continued

### Microcomputer Support Center

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will help standardize procedures. The University of Florida Transportation Research Center (TRC) operates the McTrans Center.

The center hopes to assemble a team of engineers with interests in many areas of highway transportation, plus experience in microcomputer applications. The support staff will include specialists in the areas of

traffic engineering, hydraulics, construction management, rural and urban planning, pavements, safety and highway design, among others.

Persons wishing to be on the mailing list for the McTrans newsletter, which will include notices of available software, should write to: The Center for Microcomputers in Transportation, University of Florida, 346 Weil Hall, Gainesville, FL 32611. **AT**

## Continuing Education

### How to Assure the Future of Your Airport

Airports play a much larger role in Alaskan lives than for residents of the Lower 48.

State and local officials are playing an ever-increasing role in airport planning, operations and development forced by reduced federal involvement. Public officials who understand the changing airport marketplace will be able to preserve and improve service to their constituents; those who do not will lose out in the ongoing competition for air transportation.

A two-day seminar, entitled "How to Assure the Future of Your Airport," looks candidly at responsibilities of appointed and elected officials for airports in their respective jurisdictions. It presents methods and procedures for planning, budgeting and implementing airport improvements. It offers guidance for establishing safety programs and managing risk; it provides organization and management techniques for facility maintenance; and it addresses the complex relationship between owner and tenants, including discussions dealing with leasing and renting. Additionally, the course outlines procedures to determine the true value of an airport to a community, and presents techniques for gaining public support.

This seminar was developed specifically for elected and appointed public officials whose civil responsibilities include administration of local airports. Airport committee or board members, members of city councils, or municipal employees with responsibility for airport oversight will benefit from the program. Individuals who prepare or review airport budgets and administer public funds for the operation and maintenance of airports or who supervise maintenance operations should attend. Airport managers may find this program a helpful review. This seminar will be offered May 19-20 in Salt Lake City, Utah, and May 26-27 in Eugene, Oregon. The fee for this two-day workshop is \$265, which includes breakfast and lunch, refresh-

ments and course materials. For information write NASAO, P.O. Box 55405, Madison, WI 53705 or call (608) 274-2008.

### Road Surface Management for Local Governments

This three-day course has been developed especially for people in local government with responsibilities for paved, and chip and seal roads. This course, which is sponsored by the Alaskan Transportation Technology Transfer Program, will be offered in conjunction with the Alaska Transportation Forum in Anchorage this April to eliminate travel expense to the seminar for people already participating in the forum.

Upon completion of the course, participants will understand basic road-surface management, resurfacing and rehabilitation concepts, techniques and objectives. They will be able to determine areas for making improvements in road-surface design, resurfacing, maintenance, rehabilitation and programming practices for their jurisdiction.

Participants will also learn to describe and evaluate how intergovernmental cooperation can result in improved road-surface management at lower costs. Finally, during the last afternoon, interested participants will be trained on how to train local personnel in the subjects covered in the preceding 26 days.

This course is scheduled for April 15-17 (the three days immediately following the Alaska Transportation Forum). The short-course will meet at the Holiday Inn in Anchorage from 8:30 a.m. until 5:00 p.m. for the three days. The course will cost \$50 per person; this fee includes course materials and lunch. Arrangements have been made with the Holiday Inn for accommodations at a rate of \$49 per night (plus tax) for single or double occupancy. (Please inform the hotel when you register that you are attending the seminar to get the special rates.)

To register, contact George Mueller, Transportation Technology Transfer Program, Room 525 Duckering Building, UAF, Fairbanks, AK 99775-1760 or call him at (907) 474-6152.

You can also contact anyone in the sidebar on page three of this newsletter. Participants are responsible for making hotel reservations and the cost of accommodations.

### About Our Newsletter

**Technology for Alaskan Transportation** is a quarterly newsletter that informs local transportation people in government and industry of useful publications and services. The newsletter reports on useful research findings, new technology, and learning opportunities such as workshops, seminars and video tapes. To get on our mailing list or to contribute to the newsletter, contact:

#### Editor

**Transportation Technology Transfer Program**

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### About Our Program

The goal of the Transportation Technology Transfer Program is to help local agencies obtain useful information and training related to local transportation needs. The program focuses on technology related to roads, bridges and public transportation. In addition to our newsletter, we will provide low-cost seminars and workshops, provide copies of useful technical reports upon request, and answer phone and mail inquiries related to transportation technology. If we don't have the answer, we will refer the question to a suitable specialist.

A variety of organizations support the Transportation Technology Transfer Program:

- ☐ the University of Alaska Transportation Center (UATC is an interdisciplinary center with participation from the schools of Engineering, Mineral Engineering, Management, and Agriculture and Land Resources Management).
- ☐ the Alaska Department of Transportation and Public Facilities
- ☐ the Federal Highway Administration

**We invite you** to address your questions or comments to any of the following people:

#### John D. Martin, P.E.

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Alaska Department of Transportation and Public Facilities  
2301 Peger Road  
Fairbanks, Alaska 99709-6394  
(907) 451-5150

#### Dr. Jan Botha

University of Alaska Transportation Center  
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(907) 474-7497

#### Dr. Nick Coetzee

Director  
University of Alaska Transportation Center  
University of Alaska-Fairbanks  
Fairbanks, Alaska 99775-0660  
(907) 474-6124

## Calendar of Events

We will be happy to include any relevant events you would like to publicize. Call the editor at (907) 474-6116. For information about events in Alaska, call John D. Martin (907) 451-5050 or Dr. Jan Botha at (907) 474-7497.

### 1987

**April 14—4th Annual Alaska Transportation Forum.** Anchorage.

**April 15-17—Road Surface Management for Local Governments.** Sponsored by the Transportation Technology Transfer Program. Holiday Inn, Anchorage.

**April 27-May 1—Katharine and Bryant Mather International Conference on Durability of Concrete.** Atlanta, Georgia. For more information, call Marilou Demon at (202) 334-2934.

**May 19-20—How to Assure the Future of Your Airport.** Salt Lake City, Utah. For more information, call (608) 274-2008.

**May 26-27—How to Assure the Future of Your Airport.** Eugene, Oregon. For more information, call (608) 274-2008.

### Installing Guardrails

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needs and opportunities for improving safety on many local roads and streets. This booklet should particularly interest city and borough engineers. This publication can be obtained from the Federal Highway Admin-

istration, 18209 Dixie Highway, Homewood, IL 60430. (This article was adapted from the Technology Transfer Quarterly, published by the Technology Transfer Center in Ohio.) **AT**

## Publications You Can Borrow

We have received the new National Association of County Engineers (NACE) Action and Training Guides published by the Federal Highway Administration. These comprehensive guides provide a broad range of technical and management procedures that should benefit agencies with responsibilities for local roads. We have also received NACE's pocketbook-sized training guides covering a number of practical topics.

Over the next year or so, NACE will conduct about 20 workshops nationwide to familiarize local officials and the staffs of state technology transfer centers with the guides. Participants will receive complete sets of the

guides. NACE will also distribute sets to its members unable to attend the workshops.

The action guides are separated into three volumes. There are seven training guides: Handbook on Training for Road Departments, Trainer's Guide, Blading Aggregate Surfaces, Tips for Conserving the Environment and Energy, How to Talk and Communicate at the Same Time, Improving Traffic Maintenance and Maintaining Bridges After Inspection. The guides are available for loan from Alaska's Transportation Technology Transfer Program for up to six weeks. Contact anyone in the sidebar on page 3 of this newsletter for information.

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